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The Economic Value of Iowa State University

Abstract

This analysis measures the regional economic value of Iowa State University. There are two dimensions evaluated: the overall worth of operating the university and the value of student spending in the area economy. This analysis incorporates a number of best practices for measuring the worth of universities to regional economies.

Keywords

university, economic impact, input output

Disciplines

Other Economics | Public Economics | Regional Economics

The Economic Value of Iowa State University

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Introduction

This analysis measures the regional economic value of Iowa State University. There are two dimensions evaluated: the overall worth of operating the university and the value of student spending in the area economy. This analysis incorporates a number of best practices for measuring the worth of universities to regional economies:¹

- University operations are measured with a properly specified regional input-output model that accurately reflects its major spending categories and its primary territory of economic influence.
- Student spending reflects the actual spending pattern of young adults nationally, as measured by the annual Current Expenditure Survey.
- Care was taken to not double count student spending that occurs as part of university operations, to include properly apportioning the spending of dormitory residents and other university residents.

This analysis does not contain an economic estimate of the visitorship value of the university for people who visit the university on university business; attend cultural, artistic, or continuing educational programming; or for attendees at university sporting events. An estimate of those values would require

¹ University impact analysis standards were the focus of the **Workshop on University Economic Impact: Input-Output Analysis and Other Ways To Tell Your Story**, Friday, May 3, 2013. Washington, DC. The workshop was a cooperative effort the Association of Land Grant Universities and the American Association of Universities. Representatives of the BEA and this author, representing Iowa State University, conducted formal

Persons with an interest in understanding the major issues associated with compiling credible university economic evaluations are encouraged to read Siegfried, John J., Allen R. Sanderson, Peter McHenry. **The Economic Impact of Colleges and Universities**. Economics of Education Review. 26 (2007) 546-558.

For a description of guidelines for conducting university studies, see Swenson, David. **Measuring University Contributions to Regional Economies: A Discussion of Guidelines for Enhancing Credibility**, Department of Economics, Iowa State University, 2013. Found here:
<https://www.econ.iastate.edu/sites/default/files/publications/papers/p13992-2011-08-08.pdf>

a scientifically valid survey of all major categories that stimulated attendance over the course of a typical university year. As that would be a very costly undertaking, no such data exist.²

Data Sources and Basic Analytic Assumptions

In order to maintain uniformity, data on Iowa State University total spending was obtained from the Iowa Board of Regents. As it is important to properly classify several university spending categories when specifying the economic model, the university's annual comprehensive financial report was also consulted. Information about employment, student attendance, and student housing was also obtained from the Iowa Board of Regents.

All economic analysis modeling for this study was done using the IMPLAN input-output system as well as its data sets for 2012. The region of analysis for Iowa State University consisted of Story County, where Iowa State University is located, and the contiguous counties of Boone, Hamilton, Hardin, Jasper, Marshall, and Polk. While it is the case that Iowa State University programs, services, and attendance extend to all counties in Iowa, the vast majority of its economic activity will occur in, and its employees will come from, the designated region; it is therefore not appropriate to designate the entire state as the primary service territory for a single university. Doing so would inflate the resulting multipliers and overstate the university's economic contribution.

There is not a public universities sector in the IMPLAN model. Public universities are a component of the very large state and local government education sector in the modeling system.³ Accordingly, a distinct public university sector must be created. That is done by repurposing the Private Colleges and Universities sector of the model to reflect only Iowa State University. In so doing, that sector was modified to contain Iowa State University's actual fiscal 2012 operations expenditures, the precise amount of payroll that it paid to its employees, as well as the other major expenditure components of the university. This modification process yielded a sector in the model that closely described the expected relationship the university would have with the regional economy.⁴

² In this area, it may be tempting for analysts or university relations interests to conduct "convenience surveys" of, say, attendees at a handful of sporting events to discern their spending patterns while in the region. While a convenience survey may yield useful information, it does not provide the kind of information that allows for confident generalization to a wide range of reasons for which people utilize university services. Accordingly, unless a survey is conducted that incorporates all of the best practices of survey research, to include random sampling as well as adequate sample sizes across all key visitorship categories to properly measure the phenomenon to be studied, it should not be used to produce visitorship economic impact conclusions.

³ In IMPLAN, the State and Local Education sector contains only data pertaining to employment and payments to workers. It does not contain itemized estimates of state and local education spending. For estimating university regional economic linkages, it is therefore necessary to appropriate and modify the private universities and colleges component to more completely describe public university economic relationships with the remainder of the regional economy.

⁴ The most accurate method for measuring university economic contributions is to use a "bill of goods" method. This involves a highly detailed itemization of all university spending by that which occurred within the specified region and that that occurred outside of the region. This method is time-consuming and must depend on special data sets by university accounting departments. Studies by this author have found that a "hybrid" approach to

University Spending, Employment, and Attendance

Table 1 shows the basic expenditures of Iowa State University for fiscal 2012. The university had \$1.263 billion in expenditures. For modeling purposes, those expenditures were classified into payments to value added (wages, salaries, payments to investors), all other expenses, and those for capital and equipment. It is a standard practice in input-output accounting to separate current spending from capital accounts; accordingly, payments to capital and equipment are subtracted from the total to yield a final output value of \$1.166 billion in initial output at the university.⁵

Table 1

Iowa State University Fiscal 2012 Expenditures and Modeled Output

Total Fiscal 2012 Expenditures	\$	1,263,281,041
All Value Added:		
Labor Payments to Employees		625,887,643
Debt Interest and Depreciation		90,018,825
All Other Operating Expenditures:		450,317,893
Less: All Capital Expenditures		97,056,680
Equals: Output to be modeled	\$	1,166,224,361

Table 2 describes the employment at Iowa State University. In October of Fiscal 2012, the university had 15,328 employees, more than 55 percent of whom were student employees. Referring back to Table 1, we see that these university employees were paid \$625.9 million in compensation in fiscal 2012.

modeling universities that accurately specifies employment, payments to workers, other payments to value added, as well as a university's major spending categories yields results that are very close to those resulting from more rigorous and time-consuming approaches. Accordingly, this model is a hybrid analysis that contains several major spending categories for Iowa State University, yet allows the model to estimate the likelihood the purchases were, in fact, made within the specified region.

⁵ This study does not contain estimates of the short-term value of capital development associated with new construction or the equipping of that new construction. New construction enables an increment to output at a university that is captured in future evaluations, and the "worth" of using that construction annually is measured appropriately, again in future years, by properly accounting interest payments on indebtedness and asset depreciation.

Table 2

Iowa State University of Employment

F.Y. 2012	Total
Full-time academic, admin., & institutional	1,518
Full-time professional and scientific	2,394
General services staff	1,766
Part-time non-students	699
Part-time students	8,504
Temporary employees	447
Total employees	15,328

Table 3 informs us that Iowa State University had 31,040 students in attendance in fiscal 2012. The state of Iowa supplied 61 percent of the students, other states supplied 27 percent, and 11 percent came from other countries.

Table 3

Iowa State University Student Origins

Iowa	18,922
Other States	8,316
Foreign Countries	3,510
Total Students	31,040

Table 4 shows the housing characteristics of students at Iowa State University. More than two-thirds lived off campus, with dormitories housing 23 percent of the students, and other university apartments housing the remainder.

Table 4

Iowa State University Student Housing

University Housing:	
Dormitories	23%
Other university apartments	10%
All other housing	68%

The data in the previous tables are all important to properly measuring the overall economic worth of the university and properly apportioning the economic activity. At the outset, it must be noted that the value of both student on-campus housing and student employment at the university will be contained in the analysis of the values contained in Table 1 when they are modeled. Consequently, care must be taken to not double count economic activity associated with university operations and that associated with overall student spending in the regional economy.

Understanding Impact Analysis Terminology

The overall value of Iowa State University to the regional economy is measured using a properly specified input-output model (I-O) of its primary region of influence. I-O models produce reams of useful information, but the most salient results for decision makers are (1) total industrial output, (2) labor income (3) value added, and (4) jobs. Total output for most industries is simply gross sales. For public institutions we normally define their annual expenditures, less capital and equipment purchases, as their annual output value. Labor income includes the wages and salaries of employees, along with normal proprietor payments for the management of their businesses. Labor income also includes the value of all employer-provided benefits. Value added is the most appropriate measure of regional economic value. It includes all labor income, plus returns to investors and indirect tax payments to government that are part of the production process. Value added is the same thing as Gross Domestic Product (GDP). Jobs, the fourth measure, or employment represent the number of positions in the economy, not the number of employed persons. As many people have more than one job, there are always more jobs in the economy than employed persons.

We also get detailed breakdowns of the aforementioned economic data subdivided into their direct, indirect, induced, and total economic effects. Direct effects refer to the operational characteristics of the firm or institution that we are studying; in this case it is Iowa State University. Indirect effects measure the value of demands that the direct firm or institution place on supplying industries in the study region. Induced effects accrue when workers in the direct and indirect industries spend their earnings on goods and services in the region. Induced effects are also often called household effects. Total effects are the sum of direct, indirect, and induced effects. They are the total of transactions attributable to the direct activity that we are measuring.

The term multiplier is often employed when referring to economic values or economic impacts. A multiplier, simply, is the total effects divided by the direct effects. In the first instance it is a ratio that helps us to understand how strongly industries or institutions are linked with one another in a study region. In addition, a multiplier can help us to anticipate how much the overall economy is expected to change per unit change in the direct effects (a dollar of output, a dollar of personal income, a dollar of value added, or a job). Multipliers help us anticipate the potential change in the regional economy attributable to a change in direct activity in a particular industry. Firms with strong linkages to area supplying firms or that pay relatively high earnings may yield high multipliers. Firms that are otherwise not connected strongly locally or that pay lower than average wages will have lower multipliers. Urban areas with their more developed economies have, on the average, much higher multipliers than rural areas.

It is conventional for many people to call the results of I-O analyses the “economic impacts.” In practice, however, when measuring public institutions like universities, it is advisable to reserve that designation for increments to productivity that exceed the university’s primary mission of educating in-state students and conducting research and providing services that are beneficial to the state as a whole. The university produces increments to state productivity that otherwise would not have occurred when it educates (at a much higher price) out of state students, which then results in an export sale of

educational services, or when it is able to attract research spending from federal or private sources. It is normally difficult to properly allocate the amount of economic activity that is genuinely net new productivity to the state due to research funding, other program sponsorships, or through attendance without conducting an extensive and detailed audit of university labor allocations and the overall spending and the beneficiaries of that spending in its academic, housing, research, and all other support activities.

In lieu of determining Iowa State University's unique economic impact, this study measures the university's total economic contribution to the regional economy by virtue of all spending and activity that would be expected from a public institution and that which represents increments to productivity due to the aforementioned factors. This total amount is often called the economic value, the economic effects, the economic contribution, or the economic footprint of the university. The total amount will not be called the economic impact of Iowa State University in this study.

The Economic Value of Iowa State University

University Operations

Table 5 displays the economic contribution of Iowa State University in fiscal 2012. The university had \$1.17 billion in operational output, which required 15,328 workers making \$625.9 million in labor income. The university indirectly required \$315.23 million in inputs from regional suppliers, which in turn paid \$112.6 million in labor income to 2,070 workers. When the university workers and the supply sector workers converted their earnings into household consumption, they induced \$465.9 million in additional output, which in turn required 3,849 jobholders earning \$163.3 million in labor income. Combined, Iowa State University accounted for \$1.95 billion in industrial output, \$1.19 billion of value added (or GDP), and \$901.8 million in labor income to a total of 21,247 regional jobholders.

Table 5

Iowa State University Total Economic Contribution, Fiscal 2012				
	Employment	Labor Income	Value Added	Output
Direct	15,328	625,888,320	715,909,664	1,166,231,040
Indirect	2,070	112,605,257	176,978,020	315,227,798
Induced	3,849	163,332,791	295,136,381	465,862,538
Total	21,247	\$ 901,826,368	\$ 1,188,024,065	\$ 1,947,321,376
Total Multiplier	1.39	1.44	1.66	1.67

The table also contains a row of multipliers, which are the total values divided by the direct values. An output multiplier of 1.67 means that for every \$1 of output at Iowa State University, \$.67 in output is supported in the rest of the regional economy. A value added multiplier of 1.66 means that for every \$1 of value added generated in the university, \$.66 in value added is supported in the rest of the region. A labor income multiplier of 1.44 means that each \$1 of labor income paid at Iowa State University results

in an additional \$.44 labor income elsewhere in the area. And an employment multiplier of 1.39 means that for every job at the university, there is 39/100th of a job in the rest of the economy.

In interpreting the results in Table 5 it is often tempting to go with and convey the largest number, i.e., the total output value of \$1.95 billion, to describe the worth of Iowa State University to regional economic accounts. However, standard government economic tables do not report on regional economies in terms of gross output; they measure economies based on the consequences of producing that output. Accordingly, the preferred measure of the worth of the university to its regional economy is that it contributes directly or indirectly to the \$1.19 billion in value added (or GDP), of which \$901.8 million is in the form of labor income to 21,247 employed persons.

Student Spending

Iowa State University students spend money at the university in the form of tuition and fees, board and room costs, books and supplies, and for other casual spending purposes. All of that spending is accounted already in Table 5. But students consume a wide variety of regional goods and services, and over two-thirds of Iowa State University students live off campus and obtain the lion's share of their necessary household goods from the area economy. This spending, then, represents the amount of area economic activity supported by student life after controlling for students' residences: those that reside in residence halls have one set of expected spending in the regional economy, students living in university apartments another set, and students living off-campus yet another.

Student spending patterns were estimated using the Bureau of Labor Statistics Current Expenditure Survey tables for 2012 for householders under age 25 across 25 major spending categories. Table 6 shows the amount of expected student spending during a typical 9 month school term in the regional economy and outside of the university by residency situation. Average dormitory students are expected to purchase \$2,801 in goods and services from the area economy; an off-campus student would be expected to spend \$7,760 regionally. After multiplying through by each group, university students were expected to spend \$196.4 million in the regional economy.

Table 6

Estimated Iowa State University Per-Student Spending by Housing Type

		Campus		Off	Average
	Dormitory	Apartment		Campus	All
					Students
\$	2,801	\$ 4,610	\$	7,760	\$ 6,327

Table 7 contains the input-output results of student spending at Iowa State University. It will be immediately clear to a careful reader that estimated direct output of \$148.3 million is less than total spending of \$196.4 million described above. That is because a substantial fraction of student spending

will be for retail goods, and the value of goods sold are not counted as output in the regional economy.⁶ So adjusted, Iowa State University students generated \$148.3 million in direct output, which resulted in \$39.4 million in labor incomes to 1,433 workers in the sectors that supplied those services. Considering all suppliers to those businesses as well as the induced activity that occurred once all direct and indirect workers converted their labor incomes into household consumption, Iowa State University students generated \$220.45 million in total regional output, of which \$144.75 million was value added (or GDP), and \$64.84 million was labor income 1,962 jobholders.

Table 7

The Economic Contribution of Student Spending at Iowa State University, Fiscal 2012					
	Employment	Labor Income	Value Added	Output	
Direct	1,433	39,370,852	99,449,138	148,300,239	
Indirect	261	13,633,285	23,920,421	38,255,014	
Induced	268	11,832,174	21,381,904	33,894,674	
Total	1,962	\$ 64,836,311	\$ 144,751,462	\$ 220,449,927	
<i>Total</i>					
<i>Multiplier</i>	<i>1.37</i>	<i>1.65</i>	<i>1.46</i>	<i>1.49</i>	

Table 7 also contains multipliers. Student spending yielded an output multiplier of 1.49. For every \$1 of direct output caused by the students, \$.49 in output is supported in the rest of the regional economy. For every \$1 of value added, \$.46 in value added is supported elsewhere. For every \$1 in labor income to direct workers, \$.65 in labor income is supported in the remainder of the regional economy. And the job multiplier of 1.37 means that for every job supported directly by student spending, 37/100th of a job is supported in the area.

Combined Economic Outcomes

As has already been mentioned, a portion of the induced values in Table 5 contain student employee spending, so adding university and student spending tables will result in a minor amount of double-counting. After adjusting for the overlap, Iowa State University plus the spending of its students while in residence in the region account for \$2.13 billion in regional industrial output. That output results in \$1.31 billion of value added (or GDP), of which \$955.1 million is labor income to a total of 22,936 jobholders.

⁶ Retail and wholesale goods are “marginized” in the modeling structure. The cost of the good sold as well as all of its wholesaling and transport charges are apportioned to the area in which they originate. Very few retail goods are made within the region of study; consequently, most transportation and manufactured goods values are outside of the study region.

Table 8

Combined Iowa State University and Student Spending Economic Contributions, Fiscal 2012				
	Employment	Labor Income	Value Added	Output
Direct	16,761	665,259,172	815,358,802	1,314,531,279
Indirect	2,332	126,238,542	200,898,441	353,482,812
Induced	3,844	163,600,107	295,621,011	466,771,589
Total	22,936	\$ 955,097,822	\$ 1,311,878,253	\$ 2,134,785,681

Other Regional Economic Contributions: Visitor Effects

Universities are centers for cultural, entertainment, and recreation. They host conferences and workshops, continuing education activities, and provide a range of “camps” and schools for children and adults alike. Universities produce concerts, plays, and recitals. Most notably, university sports activities entice large numbers of regular visits to the host community. And not to be overlooked, students’ family members and friends visit them while they are in residence

There is a localized, and to a lesser extent, a statewide economic impact associated with all of this visitorship provided the visitors come from outside of the primary service area of the university.⁷ The impact occurs because the visitors purchase goods and services from area providers while attending university activities or functions. Most commonly, these purchases take the form of dining and drinking, room accommodations, motor fuels, and some retail sales.

The amount spent by visitors varies tremendously by the type of activity attended. Professional visitors for conferences or workshops will have different requirements than, say, persons driving in for an evening basketball game. The spending made by summer math camp visitors, too, will also differ markedly from visitors attending a university stage production. Accordingly, without a comprehensive and scientifically valid survey of a wide range of visitors over the course of an entire year, it is not possible to estimate the full visitorship economic impact of our universities. And even if universities were to measure just their highest profile activities like sports, it would still take an extensive and no-less rigorous survey instrument administered over an entire academic year to arrive at reliable and generalizable conclusions about visitor spending and the potential economic impacts they would explain.

No visitorship impacts are measured in this study as there are no reliable data from which to base a credible analysis.

⁷ By definition, a visitor must come from outside of the primary service region. An area resident is not a visitor. Persons within the primary service territory would have nonetheless made entertainment or cultural enhancement expenditures in the region. Accordingly, they do not account for any new regional spending, and there is no increment to regional productivity.

Appendix – Describing Input-Output Results Properly

Measuring the multiplied through value of public spending using input-output models often creates misperceptions of the overall value of public spending to the state. Very large fractions of public spending originate from state own-source revenues: i.e., taxes, charges and fees. Public university funding structures are, however, much more complicated than typical state of local government services. Firstly, a hefty portion of university funding comes from the tuition and fees paid by students. This money comes from a mix of family savings, scholarships and grants, and from borrowing. Next, federal government directly or indirectly supports students through Pell Grants and student loan guarantees. The state of Iowa makes appropriations for general education and service purposes, and non-student consumers of university services and recreation opportunities purchase those goods directly from the university.

Because Iowa State University is a public university, it exists to educate and serve, firstly, the state of Iowa. A very large fraction of its annual economic output, as well as the multiplied through consequences, are therefore intrinsic components of the Iowa economy. This is the expected “footprint” of the university as an Iowa institution. As public dollars, family savings, as well as student spending have value wherever they are spent in the Iowa economy, there would always be sets of linkages and multiplied through outcomes in the Iowa economy.

The university, however, produces net new increments to productivity for the state of Iowa in these areas mainly:

1. It exports education services to out-of-state students
2. It, via winning competitive grants from federal, private, or institutional sources, engages in research and service provision that would not otherwise have occurred were it not for the ability of university researchers and service providers
3. It, via its many cultural, educational, and athletic offerings, entices spending in the state of Iowa that otherwise would not have occurred
4. Finally, student family members make trips to visit students

In terms of generating incremental impacts for the state as a whole, the first two categories produce the lion’s share of the net gains to the state’s economy. The overall impact of university cultural or athletic activities to the state are, in the main, relatively small because the overwhelming majority of sports and other cultural or educational sales are to Iowa citizens, and the number of out-of-state family visitors of students is, in the main, small.

